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An Examination of the Value of Demonstration Tapes for the Virtual Training Program

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14. ABSTRACT *(Maximum 200 words)*:

This report discusses the instructional value of the demonstration tapes associated with the Virtual Training Program (VTP) at Fort Knox, KY. This examination consists of reviewing research on demonstration materials and examining VTP participants' use of and opinions regarding these tapes. Findings from the observational learning literature and the assessments indicated that the demonstration materials would augment the VTP's training value. The literature review revealed that observational learning techniques can help the VTP participants develop their self-regulatory skills and sense of self-efficacy. The participants also felt that these tapes were useful, especially for familiarizing them with the learning situation.

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Training Systems and Education

FOREWORD

Army National Guard (ARNG) units have become an increasingly important element of post cold-war combat power. ARNG soldiers must then be trained for their new roles in the post cold-war military. To support the needed training for ARNG units, Congress has provided funding for establishing a Virtual Training Program (VTP), which utilizes the available training technologies at Fort Knox, KY, including the Simulation Networking (SIMNET) system. This program is also being utilized to support the training of active component units. Demonstration tapes showing an "exemplary unit's" execution of VTP-like exercises have recently been developed and are being used as part of this program.

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), the Advanced Research Projects Agency (ARPA), the National Guard Bureau (NGB), and the U.S. Army Armor Center (USAARMC) at Fort Knox joined efforts (Memorandum of Agreement entitled "National Guard Armor Simulation Center," April 1993) to develop and implement the VTP. The ARI Armored Forces Research Unit at Fort Knox accomplished training research and development for the VTP through a contract effort entitled "Simulation-Based Multiechelon Training Program for Armor Units (SIMUTA)," as part of Research Task 2124, "Strategies for Training and Assessing Armor Commanders' Performance with Devices and Simulations (STRONGARM)."

The present research report describes an examination of the demonstration tapes' instructional value. It integrates information from the observational learning literature and from assessments of VTP participants' use of and opinions about the developed demonstration tapes. The information in this report has been provided to training developers and instructors in the 16th Cavalry Regiment at Fort Knox and the Office of the Special Assistant to the Commanding General (ARNG). This report will also be useful to all personnel involved in the development of instructional materials, especially those materials associated with structured simulation-based training.

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AN EXAMINATION OF THE VALUE OF DEMONSTRATION TAPES FOR THE VIRTUAL TRAINING PROGRAM

EXECUTIVE SUMMARY

Research Requirement:

Army National Guard (ARNG) units have become an increasingly important element of post cold-war combat power. ARNG soldiers must be trained for their new roles in the post cold-war military. To support the needed ARNG training, Congress has provided funding for establishing a Virtual Training Program (VTP), which utilizes the available training technologies at Fort Knox, KY, including the Simulation Networking (SIMNET) system.

Demonstration tapes showing an "exemplary unit's" execution of VTP-like exercises have been incorporated into this program. The present research effort was designed to examine the instructional value of these tapes.

Procedure:

This research effort involved conducting a systematic search of the observational learning literature that dealt with procedural knowledge tasks, conceptual knowledge tasks, and cognitive strategies. It also involved assessing VTP participants' use of and opinions on the demonstration tapes. Questionnaire data were collected on 374 participants who had claimed to view the demonstration tapes prior to their VTP training. Assessment data were also obtained through group interviews of soldiers, mostly unit leaders, from two armor companies and a scout platoon.

Findings:

Findings from the observational learning literature and the assessments indicated that the demonstration materials would augment the VTP's training value. The literature review revealed that observational learning techniques can help the VTP participants develop their self-regulatory skills and sense of self-efficacy. The participants also felt that these tapes were useful, especially for familiarizing them with the learning situation.

This report's findings also suggested needed changes to these tapes. One suggested recommendation was that the tapes, especially those for battalion staff, include narration regarding the cognitive processes associated with tactical expertise. Another recommendation involved the development of additional preparation materials to be used with these tapes.

Utilization of Findings:

This report has ramifications for military trainers, evaluators, and instructional designers. Support has been provided for incorporating demonstration materials into the VTP. Also, this report has further delineated the instructional value of demonstration materials.

AN EXAMINATION OF THE VALUE OF DEMONSTRATION TAPES FOR THE VIRTUAL TRAINING PROGRAM

CONTENTS

LIST OF TABLES

AN EXAMINATION OF THE VALUE OF DEMONSTRATION TAPES FOR THE VIRTUAL TRAINING PROGRAM

This report discusses the instructional value of the demonstration tapes associated with the Virtual Training Program (VTP). This examination consists of reviewing research on demonstration materials and examining VTP participants' use of and opinions regarding these tapes.

The VTP

Army National Guard (ARNG) units have become an increasingly important element of post cold-war combat power. These units, however, have limited training resources and time. They are allocated only 39 days for training per year, including just 15 days for annual training. Congress has thus provided funding for establishing the VTP at Fort Knox, KY. This program is also being utilized to support the training of active units.

The VTP's Instructional Framework

This program has been designed to provide ARNG units with time-compressed training. Providing time-compressed training has involved utilizing the Simulation Networking (SIMNET) system and developing a structured set of SIMNET training exercises (training tables). Approximately one hundred such training tables have been created for this training program with each training table designed to be conducted in approximately two hours. One half-hour of this training time is to be spent by units on preparing for the mission, one hour on executing the mission, and another 1/2 hour on participating in an after-action review (AAR) of the exercise.

This training program also involves utilizing "turn-key" sets of training support materials, which have been designed to allow units to focus on maneuver execution. Also, operation orders, overlays and other planning materials are provided to units in advance of their VTP training. Units would focus on executing the training tasks rather than on managing and preparing for the training exercises (C. H. Campbell, R. C. Campbell, Sanders, & Flynn, 1995).

(see Shlechter, Bessemer, Nesselroade, & Anthony, 1995 for a further description of the VTP program).

The VTP's Instructional Effectiveness

Shlechter et al.(1995) used a multimethod-multisource approach to provide empirical information regarding the VTP's instructional effectiveness. Trained observers collected data from nine units; fourteen VTP instructors completed standard rating forms regarding the performance of 38 armored force units; and 280 training participants completed Likert-scale items

regarding their training experience. Data from the different methods showed that the units further developed their collective tactical skills across the training period. The instructors' ratings, for example, **indicated that units had a greater likelihood of becoming more proficient in critical subtasks than either not improving or getting worse in them.**

Making the VTP More Effective

Of course, any program can be made more effective. One possible method for improving this program comes from the work of Brown (1991; 1992). He has suggested that the use of an "a way" AAR can enhance the units' learning. The basic notions of an "a way" AAR are delineated in the following passage:

> ... "a way" (AAR) describes the execution of warfighting by a highly competent unit as captured in virtual or constructive simulation...In other words, by observing the "a way" AAR, individual staff officers and staff teams can see "how to." (Brown, 1992; pp. 1-8)

Brown (1992) has made two other assertions about the instructional applicability of "a way" AARs. One, the "a way" approach would be more suitable for less experienced battalion (BN) staffs than for more experienced ones. Two, these AARs would also be used to **prepare** the BN staff for their VTP rotation. That is, they could be used as an "information age" training tape on how to execute staff tasks. Even though Brown's discussion of "a way" materials focused on BN command and staff training, these materials would seemingly be suitable for training armored platoons and companies.

Development of the demonstration videotapes. A prototype set of "a way" demonstration videotapes was thus developed by the Simulation-Based Multiechelon Training Program for Armor Units (SIMUTA) contractor team. This contractual effort, which also developed all other training support materials for the VTP, was monitored by the U.S. Army Research Institute for the Behavioral and Social Sciences--ARI. (See Hoffman, Graves, Koger, Flynn, & Sever, 1995 for a detailed description of the SIMUTA project).

SIMUTA and ARI personnel determined that creating a demonstration tape for every VTP table was not feasible. A set of demonstration tapes was then developed representing the spectrum of tables. It was also decided that each videotape would: (a) introduce VTP participants to the instructional program; (b) introduce them to different training exercises; and (c) aid their efforts in preparing for task performance (Hoffman et al., 1995). The following tapes were thus created: (a) introduction to the VTP; (b) armor platoon offense and defense; (c) mechanized platoon offense and defense; (d) scout platoon offense and defense; (e) armor company offense and defense; and (f) armor BN offense and defense.

As indicated, each tape shows an "exemplary unit" completing a particular type of mission. Each tape also contains a narration which is designed to focus a training unit's attention on the battlefield situation and the exemplary unit's corresponding (re-)actions. The narration also, occasionally, describes the variables involved in a commander's reaction to the situation. However, the underlying decision-making processes associated with such (re-)actions are rarely discussed by platoon and company commanders. (See Hoffman et al., 1995 for further information about the content of these tapes.)

As discussed, the developed tapes have been designed to be used primarily by the prospective VTP units as part of their preparatory materials. The O/C team has tried to utilize them --as suggested by Brown (1992)--as part of their AARs. However, resource constraints have precluded this possibility. This report thus focuses on examining the instructional viability of these tapes as demonstration materials, which are considered to be observational learning techniques (see next section).

Literature Review on Observational Learning

The viability of the developed demonstration tapes must then be examined in relationship to the observational learning literature. This examination entailed locating articles through the use of the following bibliographical databases: (a) Defense Technology Information Center--DTIC; (b) Educational Resources Information Center--ERIC; (c) Psychology Abstracts--PSYCHLIT; and (d) University Microfilms International Dissertation Abstracts--UMI), and (d) back issues of journals. Information was also obtained through the use of: (a) reference sections of obtained works; (b) conference proceedings; and (c) knowledgeable individuals in psychology and instructional design. (Please note that the terms-- "demonstrations," "modeling," "observational learning," and "social learning,"--are used interchangeably in this report as they are so used in the literature.)

Overview of Observational Learning

Observational learning involves watching a model engage in a specific activity (Collins, 1991). These activities usually involve demonstrating a particular way of performing a behavior, but they can also involve demonstrating the processes or rules associated with that behavior (Bandura, 1986; Collins, 1991). Such learning can occur vis-a-vis a variety of media (Zimmerman & Boner, 1995). Computer programs have recently been designed to demonstrate, for example, the process by which an expert troubleshooter would locate a fault in different circuits (Collins, 1995).

Brief History of Observational Learning

Observational learning has been considered to be an essential component of the human experience since antiquity.

Roman educators proclaimed that one's conduct of life involves emulating positive models (Rosenthal & Zimmerman, 1978). For example, Cicero's first teaching percept dealt with the guidance of students by appropriate models (Rosenthal & Zimmerman).

Modeling has been hailed as a fundamental element of human learning and development by such diverse psychological theorists as Bandura (1986); Freud (see Hall, 1979); James (1890/1983); Miller and Dollard (1941); Piaget (1951); and Vygotsky (1978). As stated by Bandura, who has written extensively on this topic:

> Through the years, modeling has always been acknowledged to be one of the most powerful means of transmitting values, attitudes, and patterns of thought and behavior. (Bandura, 1986; pp. 47-48)

The widespread use of observational learning techniques has been demonstrated in several reviews of this literature (e.g., McCullagh, 1986; Rosenthal & Zimmerman, 1978; Sukemune, Haruki, & Kashiwagi, 1977). The effects of demonstrations have been studied in Japan, for example, in relationship to the: (a) acquisition of aggressive behavior in children, (b) extinction of dog and snake phobias, and (c) instruction of the mentally retarded (Sukemune et al). The widespread use of modeling techniques is also manifested by the present authors' search of the PSYCHLIT bibliographical database, which produced over 100 works from 1992-1995 on this topic.

Observational Learning Techniques and Procedural Knowledge

Overview of Procedural Knowledge

Armor tactical competence involves procedural knowledge or knowing how a certain activity is supposed to be performed. An armor platoon, for example, must know how to conduct a contact drill by following the sequenced steps as prescribed by Army doctrine. Procedural knowledge is thus composed of prescribed steps or rules for performing the requested behavior or activity (Gagne, 1985). A function of the VTP is then to help participants to practice the steps associated with armor tactical competence. Further details about procedural knowledge can be found in the following sources--Anderson (1983), Gagne (1985), Austin and Miller (1992).

Research on this topic has primarily dealt with either psycho-motor or manipulative tasks. Psycho-motor tasks usually refer to physical tasks, involving a continuous sequence of activities, e.g., doing a gymnastic routine. Manipulative tasks consist of performing a discrete sequences of step, e.g., assembling a rifle. Even though the VTP is not designed to train participants to perform psycho-motor tasks, the discussion of the literature dealing with observational learning and psycho-motor tasks does provide insights into the instructional viability of utilizing demonstration techniques. Thus, the remainder of this

section deals with examining the effects of observational learning techniques vis-a-vis psycho-motor and manipulative tasks.

Observational Learning and Psycho-Motor Tasks

Much has been written on the use of demonstration techniques for psycho-motor skill learning (e.g., Annett, 1991; Burwitz, 1981; Singer, 1980). Singer (1980) has maintained that modeling procedures are a fundamental means for learning new psycho-motor skills. Burwitz has also noted that a majority of sports coaches and physical education teachers believe that demonstrations benefit the acquisition and performance of a physical skill.

Several successful commercial products (e.g., Sybervision, and Golf My Way by Jack Nicklaus) employ observational learning techniques to enhance performance for such sporting activities as golf, tennis, and baseball (Austin & Miller, 1992). Seemingly then, modeling has a positive effect upon psycho-motor skill learning and athletic performance. There is, however, limited research evidence on this topic.

Furthermore, the available literature does not provide any consistent patterns regarding the effects of modeling on athletic performance. For instance, Burwitz's (1981) review of this literature has revealed studies showing positive (e.g., Lockhart, 1944) and negative effects for modeling (e.g., Nelson, 1958). This inconsistency may be the result of problematic research as Burwitz' review mainly consisted of one-shot field studies.

Conflicting findings regarding the effects of modeling on athletic performance were also found in more controlled research studies (Hall & Erffmeyer, 1983; Austin & Miller, 1992). Hall and Erffmeyer (1983) found positive effects for modeling, as compared to verbal instructions, upon the free throwing shooting accuracy of basketball players on a female college team. Austin and Miller (1992), however, failed to find any effects for modeling--as done in the Sybervision Golf Program--on the golf swing of college students. Both of these studies were problematic, however, as a limited number of research participants were sampled---10 in Hall and Erffmeyer's and 20 in Austin and Miller's. Also, these studies measured different types of behavior. Hall and Erffmeyer (1983) measured performance improvement; while Austin and Miller's study (1992) evaluated their research participants' ability to imitate the model's bodily movements. Perhaps, the inconsistencies in this literature might have also been a result of researchers' sampling different types of criterion measures.

Correspondingly, modeling effects on psycho-motor skill acquisition were shown to be more pronounced for measures dealing with students' regulatory processes than for those dealing with their imitative abilities (Feltz, 1982; Gray, Neisser, Shapiro, &

Kouns, 1991; Whiting, Bijlard, & den Brinker, 1987). This point is illustrated by Gray et al.'s findings. Thirty-four female college students with no prior dance training participated in this study. Each participant was trained in one of three conditions: (a) kinematic with music, consisting of viewing the performance with music of a trained ballerina; (b)kinematic without music; or (c) static, consisting of viewing a series of photographs taken from critical points in the dance. Based on ratings by a professional ballerina, research participants in the kinematic conditions did better with regards to categories--movement flow and rhythm and hesitation--associated with controlling one's movement. However, differences among groups were not found with respect to categories--arm position and movements--associated with imitating bodily movements.

Several studies have also stressed the need for proper implementation of the observational learning techniques (e.g., Burwitz, 1975; McCullagh, 1986). Burwitz (1975) has delineated the following conditions for successful utilization of modeling techniques:

1. The **strategy or techniques which govern** successful performance must be visible to the performer (italics are the present authors'). This point has been corroborated vis-a-vis research conducted by Scully and Newell (1985 as cited by Annett, 1991), and relates to the development of self-regulatory processes.

2. The observer must have an ability **to imitate** the demonstration action.

McCullagh (1986) found that the model's status was another determinant for successful implementations of observational learning techniques. Thirty-six females, ranging in age from 11 to 14 years, completed a balanced ladder task after a demonstration by either a high- or low-status model. The model's status was defined by the teacher. Research participants viewing the high status model performed significantly better than research participants viewing the low status model. McCullagh's data thus showed the importance of utilizing models with high perceived status, e.g., an exemplary armor unit.

Observational Learning and Manipulative Tasks

Limited research also exists on modeling effects upon research participants' abilities to perform manipulative tasks. There were, for instance, fewer than five citations on this topic in both of Holding's (1965; 1987) reviews. Also, Holding's reviews found equivocal support for the use of modeling techniques. Laner (1954 as cited by Holding, 1965), for example, failed to find any differences in the performance scores of research participants who were trained by watching a film on how to assemble a dismantled trigger and those who received written

instructions. Holding (1965) concluded his section on demonstration techniques by noting that:

> ...demonstrations and films show the learner what he is required to do, thus setting a standard against which he can compare his own effort. (p. 66)

In a study not reviewed by Holding (1965; 1987), Gropper (1970) found evidence supporting the instructional value of film demonstrations and procedural skill learning. Eighty-nine male and female seventh graders were provided filmed instructions regarding the proper procedures for assembling a three-pole electric motor. These research participants obtained a mean error score of 4.18 out of a possible 84 errors. However, this finding was problematic as there was not an equivalent comparison group.

Optimizing observational learning techniques. An extensive literature, which is mainly based on military studies, does exist on ways for optimizing the instructional value of demonstration materials (e.g., Lumsdaine, 1961; Miller, 1972). This literature has suggested that a demonstration film should: (a) direct students' attention to the relevant cues; (b) have an instructive narrative; (c) be vivid; and (d) be played several times for maximum effect (Miller, 1972). Regarding the issue of instructive narrative, Jaspen(1950) found that a "how-it-works" narrative was more effective when placed at the beginning of the film than at the middle or end of the film.

Several researchers have also noted the importance of active viewing by the trainees (e.g., Hovland, Lumsdaine, Shefield, 1949 as cited by Michael & Maccoby, 1953; Jaspen, 1950; Kimble & Wulff, 1961; Michael & Maccoby, 1953). Maccoby and Michael found that audience participation, which involved practicing the materials while watching the film, resulted in considerable improvement in learning the materials as compared to simply viewing the film. Jaspen, furthermore, discovered that active participation is beneficial as long as the trainees can view the film and perform the task without too much loss of attention to either.

The most recent research which could be found on this topic was conducted by Baggett(1987). This study consisted of 360 college students who were being taught to build a model helicopter from an assembly kit. The following instructional methods for teaching this task were examined--a) narrative film (one viewing or two); b) hands-on practice (one building or two); and c) combination of the two (see film first, build second or vice-versa). Research participants in the instructional condition of hands-on practice followed by the demonstration materials had the fewest problems in completing the task. Further support was provided for the argument that modeling techniques are especially effective vis-a-vis appropriate practice strategies. In this case, the appropriate instructional

strategy entailed practice followed by demonstration.

Section Summary

A limited number of research studies have been found regarding the effects of observational learning techniques upon the acquisition of procedural knowledge skills. This limited literature indicates that modeling influences may be more pronounced upon learners' regulatory processes than upon their imitative abilities.

Also discussed is the more extensive literature dealing with amplifying the instructional potential of observational learning techniques. These studies have stressed the need to: (a) incorporate the use of demonstration materials with strategies for practicing the skills; (b)develop visual cues or a narrative which helps guide viewing of the materials; (c) make visible the principles/processes associated with task completion; and (d) use models with perceived high status.

Observational Learning and Conceptual Knowledge

Overview of Conceptual Knowledge

Conceptual knowledge refers to understanding the rules or principles associated with performing an activity (Alexander, Schallert, & Hare, 1991; Farnham-Diggory, 1994). Such knowledge thus leads to transfer and to solving a novel problem (Gagne, 1985). An armor unit leader, for instance, needs to understand the principles of METT-T (Mission, Enemy, Terrain, Troops, and Time) in order to successfully engage the enemy.

Observational Learning Techniques and Conceptual Knowledge

Much has also been written about the potential implications of modeling upon the acquisition of conceptual knowledge (e.g., Bandura, 1972; Gropper, 1963, 1968; Zimmermann & Rosenthal, 1972). Gropper (1968) discovered that complex and highly abstract principles can be acquired on the basis of visual demonstrations. He also found, however, that relying solely on visual lessons results in marked inefficiency in students' mastery of conceptual materials. Verbal information, if used properly, is thus needed to make the task's invisible underlying concepts visible.

Positive effects for "explanatory models" have also been found by Rosenthal and his colleagues (Rosenthal, Moore, Dorfman, & Nelson, 1971; Zimmerman & Rosenthal, 1972; Zimmerman & Rosenthal, 1974; Rosenthal & Zimmerman, 1978). Zimmerman & Rosenthal (1972) showed that third-graders who watched a model and received rule-provision instructions on a numerical concept task were better able to perform the task than third-graders who only watched a model or only received rule instruction. Based on such data, Zimmerman & Rosenthal (1978) have noted the

instructional benefits associated with combining verbal and visual modes of information transmission.

Cognitive modeling[1] techniques. The work of Rosenthal and Zimmerman (1972; 1978) has led to the development of cognitive modeling techniques. This approach consists of the model or another person verbalizing the relevant rules associated with successful performance and/or the model's thoughts while performing the action (Schunk & Zimmerman, 1995). Such narration is supposed to make visible the task's invisible aspects (Ehlinger, 1988).

Studies by Schunk (1981, 1984) and Mandinach (1987) provided evidence for the instructional value of cognitive modeling. Mandinach (1987) showed that research participants who received instructions through cognitive modeling took less time to complete a computer game and achieved higher levels of transfer than did the research participants who engaged in discovery learning. In addition, Schunk (1981) found that cognitive modeling was more effective than self-paced instruction for helping third-grade students who had problems doing math.

Other studies produced less definitive support for the use of cognitive modeling (e.g., Robert & Chaperon, 1989; Honebien, Carr, & Duffy, 1993). Robert and Chaperon found that cognitive modeling was not superior to exemplary (behavioral) modeling in helping college women to master a Piagetian water-level task. Additionally, Honebien et al.'s study showed that cognitive modeling (computer animation plus narration) did not have any effect on college students' ability to solve a crime in the computer game, Where in Time is Carmen San Diego. Their results also indicated that cognitive modeling did contribute to the development of the research participants' cognitive skills, e.g., participants who used key task strategies.

Observational Learning and Cognitive Strategies

Overview of Cognitive Strategies

The effective use of cognitive strategies has been theorized to be an important element of intellectual competence (Sternberg, 1985). Sternberg has noted that experts and novices differ with regards to their use of metacognitive components, which serve to evaluate, monitor and **regulate** one's cognitive strategies. Experts tend to solve problems as though equipped with ever-present monitors operating just below the surface of consciousness, which serve to guide their performance (Derry &

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[1] The term cognitive modeling is initially found in Meichenbaum's (1977) work on behavior modification. It has been used in still a different context in conjunction with artificial intelligence (Kieras, 1987 as cited by Farmer, Buckmaster, & LeGrand, 1992).

Hawkes, 1995; Sternberg, 1985).

Armor expertise also involves the acquisition and development of cognitive strategies. An expert BN staff must process battlefield information quickly and accurately in order to support the commander's ability to make quick and accurate decisions (Olmstead, 1992 as cited by Brown, 1992). Tactical expertise also involves a unit leader's abilities to: (a) monitor the unit's position in a hostile situation (situational awareness); (b) plan a course of action; and (c) evaluate the situation (Halff, Hollan, & Hutchins, 1986).

Cognitive Strategies and the Social Cognitive Theory

The social cognitive position contends that modeling has a positive effect on the development of self-regulatory processes (e.g., Bandura, 1986; Zimmerman & Bonner, 1995). As noted by Bandura:

> In complex activities, the thinking skills guiding actions are, in many respects, more important than the modeled actions themselves. People who lack problem-solving skills benefit more from observing people model self-guiding thoughts in conjunction with actions than from seeing the actions alone. (pp. 320)

This position also holds that the development of self-regulatory skills is a mark of skill expertise (Schunk & Zimmerman, 1995). This development occurs across different phases with the initial phase of self-regulatory development involving an adaption of a modeled standard of performance. Students then compare their performance to that of the standard. Finally, they develop an internal standard of performance. (See Bandura, 1986 and Schunk & Zimmermann, 1995 for a more detailed description of this process.)

Associated with the development of self-regulatory skills comes a belief, termed self-efficacy, in one's capabilities to learn or perform behaviors at designated levels (Bandura, 1986). Bandura has noted that perceived self-efficacy does not deal with the skills one has but with judgements of what one can do with his/her skills. Also, a person with a high degree of self-efficacy should have more task persistence than those with low levels of self-efficacy (Bandura, 1977). Self-efficacy is therefore considered to be a salient property of expertise (R. Brown & Pressley, 1994).

Empirical support does exist for the stated positions of the social cognitivists (e.g., Bandura, 1986; Ehlinger, 1988; Gorrell & Capron, 1987; Zimmerman & Ringle, 1981). Gorrell and Capron have found that cognitive modeling is more effective than direct instructions for raising the self-efficacy beliefs of prospective teachers. Additionally, Zimmerman & Ringle have shown that a

model's statements of self-confidence are a salient predictor of young children's self-efficacy for a problem-solving task.

Modeling techniques do apparently help learners, especially the less advanced ones, develop their self-regulatory skills and sense of self-efficacy. However, as emphasized previously, the effectiveness of such modeling techniques is dependent upon the effectiveness of the entire instructional program. The instructional elements associated with the social cognitive theory are delineated in the works of Zimmerman and his associates (Schunk & Zimmerman, 1995; Zimmerman & Bonner, 1995; Zimmerman & Martinez-Pons, 1992).

Cognitive Strategies and the Cognitive Apprenticeship Model

The basics of cognitive apprenticeship.

Collins and his associates have suggested that the effects of cognitive modeling can be augmented when embedded into their cognitive apprenticeship model (Collins, J.S. Brown, & Newman, 1989; Collins, 1991, 1995; Collins & Brown, 1988; Goodrich, Collins, Holum, & Hatch, 1995). This instructional model, which is based on traditional methods of apprenticeship, is geared toward helping students master an academic skill's visible and invisible aspects.

Modeling is at the heart of any apprenticeship-mentor relationship. That is, traditional apprenticeship involves the mentor's showing the apprentice how to do the task, helping the apprentice to do it, and then allowing the apprentice to do the task on his/her own (Goodrich et al., 1995). The learner's journey from apprentice/novice to master/expert thus proceeds from dependence on the model/instructor to a sense of autonomy and efficacy in performing the task(s).

Proponents of the cognitive apprenticeship model make several points regarding modeling. Effective modeling, for one thing, involves promoting real-life solutions by being situated in an authentic "work" context (situated cognition: J. S. Brown, Collins, & Duguid, 1989). The VTP is an example of situated cognition as the SIMNET system has been designed to reproduce many of the conditions inherent in field exercises (Shlechter, Bessemer, & Kolosh, 1991).

Also, effective modeling is embedded in apprenticeship programs which contain the following teaching methods--coaching, scaffolding and fading (Goodrich et al., 1995). Coaching is the process of overseeing the apprenticeship's learning by: (a) observing one's apprentices practicing the task; (b) giving them instructional cues and (c) providing them with feedback Scaffolding refers to the support structures (e.g., instructional prompts) provided by the master to the apprentice as the latter practices the task; fading thus refers to the master's removing the support structures, enabling the apprentice to take more and more responsibility in executing the task (Goodrich et al., 1995)

An O/C serves as a coach for his unit by being instructed to do all of the above, including scaffolding and fading the instructional situation by making the units less dependent on his guidance. VTP participants, however, must still rely on the O/C to provide them with a preview of each table.

The cognitive apprenticeship program also includes teaching methods--articulation, reflection, and exploration--which have recently been developed to foster students' acquisition of cognitive skills (Goodrich et al., 1995; Collins et al., 1989; Collins & Brown, 1988). Articulation consists of getting students to verbalize their reasoning or problem-solving processes for completing the task; reflection involves comparing the products and processes of students to those of the expert; **exploration involves pushing the student** into a self mode of problem-solving. All these teaching methods are found in the VTP. Articulation, for example, is manifested by the AARs' being designed to get the unit leaders to express their battle decisions (Brown, 1992). However, the reflection process for the VTP would be amplified if the O/Cs could utilize the "a way" tapes during their AARs.

Support for the cognitive apprenticeship model. Educators and instructional designers have demonstrated considerable interest in the cognitive apprenticeship model. This interest is manifested by a search of the ERIC bibliographical data base, which produced 51 citations on this topic published since 1991. These works have varied from using this model for professional training purposes (Farmer et al., 1992; Lajoie & Lesgold, 1992; National Council on Vocational Education, 1991); to using it for improving the reading and writing skills of academically at-risk students (Thornburg 1991). Lesgold and Lajoie, for example, have discussed using elements of the cognitive apprenticeship model in their computer-based coached practice environment for training avionics skills (SHERLOCK: Lesgold, Lajoie, Bunzo, & Eggan, 1992).

Elements of the cognitive apprenticeship model have been found in still other computer-based instructional programs. Among the most notable of these programs are the: (a) ASK system for teaching business skills (Shank, 1990); (b) Teaching Arithmetic Problem-Solving (TAPS) system for improving word-problem skills at grades 4 through remedial 13 (Derry & Hawkes, 1995); (c) Strategic Teaching Framework (STF) system for teaching prospective educators (Duffy, 1995); and (d) Jasper Woodsbury Series for teaching problem-solving skills to elementary school students (The Cognition and Technology Group at Vanderbilt, 1993). The Jasper Woodsbury program, for instance, uses information rich videodisc environments in order to situate the modeling of problem-solving skills in real-life situations.

However, only a few evaluation studies have been reported on instructional programs based on the cognitive apprenticeship model. The available evaluations (e.g., Lajoie & Lesgold, 1992; Thornburg, 1991), though, do provide empirical support for this

model's validity. For example, an Air Force evaluation of the SHERLOCK systems has shown that the SHERLOCK trained research participants are as proficient in troubleshooting the test station as technicians who have been on the job for four years or more (Lajoie & Lesgold).

Further empirical support for the teaching methods embodied in the cognitive apprenticeship model have come from research on instructional paradigms, which preceded it(e.g., Palincsar & Brown, 1984; Scardamalia, Bereiter, & Steinbach, 1984). Scardamalia et al (1984), for example, have demonstrated the teachability of reflective processes in written composition. Instructions for the Scardamalia et al.'s teaching paradigm includes modeling of think-aloud strategies and use of cues to stimulate self-questioning during planning monologues. Students who were taught by this method engaged in more self-regulatory behaviors (e.g., planning and monitoring one's behaviors) than students who were taught by a more conventional teacher-directed method. Further evidence has consequently been provided for the use of modeling techniques to foster the acquisition of cognitive skills, especially those associated with self-regulatory behaviors.

Reflections on the Observational Learning Literature

The following findings have emerged from this review:

1. Limited and inconclusive evidence exists regarding modeling influences upon students' acquisition of **procedural and conceptual knowledge.**

2. Observational learning techniques are useful for providing students with an initial standard of performance.

3. Observational learning techniques are also useful for helping students to acquire the self-regulatory skills and sense of self-efficacy needed for skill expertise. Correspondingly, as discussed, students may have problems with actually imitating the model's actions.

4. The effectiveness of any observational learning technique is dependent upon the effectiveness of its concomitant instructional program. As previously noted, a seemingly effective program for utilizing modeling techniques would be one like the VTP which contains elements of the cognitive apprenticeship model.

Thus, the utilization of the VTP's demonstration materials by prospective participants would apparently make it a more effective program. The less experienced personnel and units would benefit from these tapes by becoming familiar with the VTP and SIMNET; while these tapes would help unit leaders and BN staffers to acquire the cognitive skills necessary for tactical leadership.

Questions still remain, however, regarding the instructional benefits of these tapes. As indicated, the demonstration tapes may not be totally effective because the narration does not include comments about the "processes" associated with table execution. The tape must further emphasize the model unit's status as an "exemplary unit." Also, VTP participants who feel that they have to perform at the level of the "model unit" may experience learning problems. This point is based on Bandura's (1986) belief that unreachable standards lead to learner frustrations. The VTP participants may also not have the desire nor time to properly view these tapes. Insights are thus needed into VTP participants' opinions toward and use of these tapes.

The Participants' Assessments of the Demonstration Materials

For reasons discussed later, this assessment consisted of two phases--a Questionnaire Phase and an Interview Phase.

The Questionnaire Phase

Method

Participants. Data were collected on 373 participants who had claimed to view the demonstration tapes prior to their VTP training. One hundred seventy of them were identified as drivers, loaders and gunners; 165 of these participants were classified as serving in various line and staff positions; 38 did not specify their position.

The participants per unit type were as follows: (a) 285 armor platoon/company; (b) 32 mechanized platoon;(c) 24 scout platoon; and 32 BN staffers. The latter group of participants came from an active unit while the other participants were ARNG personnel. Also, 257 of these participants had previous SIMNET experience with 194 of them claiming to have SIMNET experience within the last 12 months. However, information on SIMNET experience was not obtained on approximately 30 participants who were part of the pilot test (see discussion on the questionnaire).

Instrument. A 13-item questionnaire was created by the evaluation team (see Appendix A). The first six items dealt with issues associated with the units' use of the demonstration tapes. Respondents' opinions about the value of the demonstration tapes were assessed by items 7-9 and 11 with items 7-8 being Likert-scale items. Item 10 was designed to measure the participants' recall of specific actions from the tapes, which was to be another indicator of their usefulness. Item 12 was created to provide insights into the participants' opinions regarding any needed modifications to the demonstration tapes.

This instrument was piloted on an ARNG armor company, which was included as part of the data sample. Based on this test, some minor wording changes were made to this questionnaire and an

additional item was added to assess participants' previous SIMNET experience (see item #13).

Data collection procedure. The questionnaire was group administered to the participants toward the end of their VTP training. All ethical guidelines prescribed by the Army Research Institute (ARI) and the American Psychological Association (APA) were followed in administering these questionnaires.

Also, the data collectors stressed the need for the participants to respond in relationship to the demonstration tapes rather than to the SIMNET familiarization tape shown at the training site. This procedure was implemented as a precaution against having confounded data.

Scoring procedures. Items 7 and 8 were numerically coded in the following manner, respectively: (a) too little information =1, right amount=2 and too much =3; and (b) not at all useful=1, slightly useful=2, fairly useful=3, and extremely useful=4. Content analyses were performed on items 9-12. These analyses were performed by a graduate student intern at the ARI's Armored Forces Research Unit (AFRU) with assistance from a research psychologist at that unit.

Results and Discussion

Three caveats must be made about these data. One, only descriptive accounts of the data are presented due to the exploratory nature of this investigation and the composition of the data. Two, some of the data may have been problematic. For example, 8% of the drivers, loaders, and gunners have claimed to view the BN staff tapes; however, these tapes have not been designed for their viewing. Three, the data are collapsed across the sample. This has been done because evaluators are only looking for generalized trends in these data.

Use of the demonstration tapes. Participants' responses to questionnaire items 2-6 revealed the following about their use of these tapes (see Appendix B for a more complete account of these data):

1. As expected, the VTP introductory tape was viewed by the most participants with 63% of them making this claim. Thirty-six percent of the participants claimed to have viewed the platoon offense and defense tapes, respectively while the other tapes were viewed by fewer than 20% of the respondents. (These percentages, which were based on responses to item 2, varied slightly across the different questionnaire items.)

2. Approximately, 78% of the respondents claimed to have viewed most of these tapes within the last two months. This figure was lower for the two mechanized tapes as approximately 55% of these respondents professed to have viewed the tapes more than two

months ago. (These percentages were also based on responses to item 2.)

3. The respondents claimed to have viewed these tapes with others as responses to the "watching only with others" and "mostly with others" categories accounted for 94% of the responses to Item 4.

4. The units tended to discuss these tapes for less than an hour with responses to this category representing 55% of the responses to item 5; the "more than an hour" category accounted for 30% of the responses to this item. The Company Armor Offensive Tape had the highest percentage (43%) of the "more than an hour" responses.

5. The units were inclined to watch the tapes straight through from beginning to end with this category accounting for 67% of the responses to item 6. The "Introduction to the VTP" tape had the highest percentage of responses to this category (84%) while the armor company tapes had the lowest percentage of responses (51% for the offensive tape and 53% for the defensive tape).

Perceived value of the demonstration tapes. The data for items 7 and 8, which deal with the tapes' perceived usefulness and informativeness, are presented in Table 1. The participants, regardless of their position[2], tended to believe these tapes were fairly useful with a mean usefulness rating of 3.03 for the different tapes. They correspondingly felt that these tapes contained just about the right amount of information with only 19% of them indicating the need for adding more information to these tapes.

The perceived usefulness of these tapes was manifested by two other results. One, 88.7% of the participants felt that these demonstration tapes should be provided for other tactical training purposes. Two, 62% of them made comments on item 9 about points from the VTP tapes which they considered to be useful. Also, only four participants remarked that the tapes provided little useful information.

The participants thought that the VTP tapes were particularly useful for providing them with a general picture of the learning situation, which included familiarization with both SIMNET and the VTP. Such remarks accounted for 56% of the comments to item 9. Also, familiarization with the learning situation was the most frequently mentioned reason for developing these tapes for other tactical training programs, accounting for 43% of these stated reasons (item 11a). These findings, however,

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[2] As shown in Appendix C, the data presented in Table 1 parallel those found for the unit leaders. This finding is another reason for collapsing the data across positions.

were based on responses from 62% and 57% of the participants for items 9 and 11a, respectively.

Table 1

Means of Participants' Responses to Questionnaire Items Dealing with The Tapes' Usefulness and Informativeness

Tape	Usefulness*	Informativeness**
Introduction to the VTP	2.93 (n=235)***	1.78 (n=238)
Armor Platoon Offense	3.01 (n=170)	1.86 (n=171)
Armor Platoon Defense	3.04 (n=131)	1.87 (n=127)
Mech Platoon Offense	3.00 (n=23)	1.71 (n=21)
Mech Platoon Defense	3.05 (n=20)	1.75 (n=20)
Scout Platoon Offense	2.93 (n=42)	1.76 (n=42)
Scout Platoon Defense	2.83 (n=40)	1.75 (n=40)
Armor Company Offense	3.17 (n=70)	1.86 (n=74)
Armor Company Defense	3.28 (n=50)	1.86 (n=53)
Armor BN/TF Offense	3.24 (n=49)	1.94 (n=49)
Armor BN/TF Defense	3.25 (n=51)	1.96 (n=51)

*with 1=not at all useful; 2=slightly useful; 3=fairly useful; 4=extremely useful.
**with 1=too little information; 2=right amount of information; 3=too much information.
*** number of respondents.

Participants also felt that these tapes did provide performance standards. Remarks about showing effective or proper unit activity represented approximately 30% of the comments to items 9 and 11a. For example, 31 responses to item 9 dealt with showing effective command and control techniques.

It must be finally noted that the data on recalling specific actions were problematic because only 47% of the participants answered this question. Additionally, the participants rarely recalled any specific actions taken by the exemplary units. Perhaps then, the evaluators needed to prompt the participants' memories of these tapes. (The results of the content analyses

associated with the participants' open-ended responses, including their recall data, can be found in Appendix D)

Suggestions for changes. Only 14% of the participants made any comments concerning needed changes to these tapes (item 12). Ten of these comments dealt with making more tapes available to the units; six dealt with including all crew stations in future tapes, and four were about command and control teamwork. These limited number of comments could be another indication that the participants had few problems with these tapes. Or, it could have been that the participants did not want to answer this question.

Summary of the questionnaire data. Participants tended to view the tapes as a unit at their home station. They found them to be useful and informative. Limited empirical support was also obtained regarding the value of using modeling techniques to help trainees to become familiar with a learning situation and to acquire a standard of performance.

Questions remain, however, about these data. Why, for example, did the units tend to view these tapes straight through without seemingly much discussion? Also, as discussed, these data were problematic. It was thus decided to further assess VTP participants' use and perceptions of these tapes by interviewing them.

The Interview Phase

Method

Participants. These participants came from two ARNG armor companies and an ARNG scout platoon.[3] They were only supposed to be the unit leaders; however, because of a problem in coordinating this assessment with the O/C team, two armor platoons also participated.

The units selected did have previous experience with VTP training and did view the tapes. Also, each armor company consisted of four platoons with four tanks per platoon. The scout platoon consisted of two sections with five vehicles per section.

Instrument. An interview protocol was created for this assessment. This protocol consisted of the following sections:

1. Use of the VTP tapes--which included questions about whether the units used the tapes to rehearse their upcoming VTP missions. This section also contained a question about any problems that the participants might have had with using the tapes.

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[3] The unit leaders from one of these armor companies also participated in The Questionnaire Phase.

2. Content of the VTP--which contained questions about the participants' abilities to recall specific events and their perceptions about positive aspects of these tapes.

3. Final comments--which included questions about needed modifications to the demonstration materials.

Data collection procedure. Data collection consisted of group interviews which were conducted by a research psychologist and a graduate student intern at the AFRU. The research psychologist was responsible for facilitating the interview process, while the graduate intern took notes and asked the participants to elaborate upon some of their answers. The sessions, which lasted approximately thirty minutes, were also tape recorded. It must again be noted that the ethical guidelines prescribed by the ARI and the APA were followed during this data collection process.

Scoring procedure. Content analyses were performed by the graduate intern. These analyses were based on his notes and the session tapes.

Findings and Discussion

This discussion focuses on the major trends revealed by these interviews. A more detailed picture of these data can be found in Appendix E.

Use of the tapes. The two armor companies claimed to have used these tapes to rehearse and discuss their VTP rotation. They also claimed to have used these tapes to discuss tactics. The scout platoon, however, did not comment on whether they discussed these tapes or used them to rehearse.

The two most prominent modes of using the tapes for preparing for a VTP orientation involved: (a) starting and stopping them during the rehearsals and (b)viewing them straight through and then rehearsing. Each of these viewing modes was mentioned eight times during these interviews. Five participants from armor companies also intimated that their units did not have the time to thoroughly discuss the tapes. In addition, three scout leaders complained that these tapes were too long.

Usefulness of the tapes. These interviews also indicated that these tapes were useful for helping one to(re-)familiarize oneself with the learning (SIMNET) environment and to acquire a standard of performance. Six participants contended that these tapes were either a good introduction or refresher to the SIMNET environment, including the VTP missions; while five insisted that these tapes were good for setting standards for performance or showing the "big picture." As noted by one company commander: "these tapes did a good job of setting high standards for communications, tactics, and maneuvers."

The exemplary unit's activities dealing with command and control were also frequently cited by the participants as helping them to complete their VTP missions. Such activities were mentioned by eight participants as being particularly memorable. One participant declared, "All the spot reports were short, crisp, and precise." However, as manifested by this statement, the participants had problems recalling the precise events that were helpful. Such problems existed even after the participants were prompted by the interviewer.

Problems with these tapes. The sampled ARNG personnel did have some problems with the tapes' content. Four participants--including a crewman--claimed that the tapes were not much help with regards to crew skills. These tapes, however, were not designed to help develop individual crew skills.

Three others correspondingly declared that the tapes were not very realistic. As one company commander asserted:

> ...as I look at the tape it still is not the same because you're looking at graphics from outside the vehicles. We're given a picture of everyone while we're looking through the vision blocks and that's all we can actually see. So it's not really a leader's recon. We're still not sure what we're supposed to expect.

Another participant made the following observations about the demonstration tapes:

> It would be good to have scenarios where friendly forces were less than perfect. Then we could review actions taken and see what went wrong and why...

Recommended changes. Two related changes dominated this discussion. For one thing, the participants wanted the demonstration tapes to be PC-based. Twelve different participants made this comment. As one of them stated, "it would be very helpful if the tapes were interactively based--like many video games."

The participants also desired that more VCR copies of these tapes be developed for home use. It seemed that such home use would help them to spend more time reviewing the tapes. Four participants made comments to this effect. As put by one of the participants:

> We have such a short exposure/chance to re/view, if we could take the tapes home, we could keep our minds fresh beyond what we could retain from a two day training weekend per month.

Finally, the participants did not think that the narrator should have spent more time talking about tactics. Two participants noted, however, that the narrator should have talked

more about SIMNET. The lack of narration regarding tactics could have been a concern for BN staff personnel.

Summary of the interview data. This assessment does provide insights into the questions posed from the questionnaire phase of this assessment. These tapes are seemingly useful for helping these ARNG personnel to become (re-)acquainted with the learning environment and for providing them with a sense of performance standards. Also, some units do not seem to systematically view these tapes. This problem may be, at least partially, a function of the time constraints associated with home-station training. Finally, these data have indicated that ascertaining the participants' memory of **specific** events or actions from the demonstration tapes is problematic.

Conclusions and Implications

As discussed, the VTP is an appropriate program for utilizing modeling techniques as it contains elements of the cognitive apprenticeship model. Findings from the literature review and assessments have correspondingly suggested that the demonstration tapes would provide a standard of performance for the less experienced VTP participants and would help all participants to (re-)familiarize themselves with the instructional situation. Thus, these materials should augment the VTP's instructional effectiveness by **preparing** prospective VTP participants to execute the training tables.

The VTP participants should not be expected to imitate the "model unit's" tactical performance. That is, research participants have tended to have problems with copying a model's actions (e.g., Feltz, 1982; Gray et al., 1991; Whiting, et al., 1987). The VTP demonstration tapes--as suggested by Brown (1992)--should then be seen as **"a way"** rather than **"the way"** to execute the different types of VTP exercises. It is consequently not necessary to produce tapes for each table.

There are additional reasons for not producing tapes for each table. A generic tape would suffice for providing a standard of performance for the less experienced VTP participants and helping all participants to (re-)familiarize themselves with the instructional situation. Also, Holding (1987) argues that demonstrations of actual movements may be unimportant for procedural skill learning. Hence, developing a generic set of tapes seems to be warranted.

This report has also indicated potential instructional limits with the VTP tapes. These tapes may not, for example, help the VTP participants to become more knowledgeable with regards to tactical procedures and concepts. As noted in the literature review, limited and inconclusive evidence exists regarding the effects of demonstration materials upon students' acquisition of procedural and conceptual knowledge.

Potential shortcomings with these tapes have also been found. The narration needs to delineate the cognitive processes associated with tactical decision-making. This change would help unit leaders and BN staffers develop the skills necessary for tactical leadership. The narrator should also describe the "model unit" as being at a high state of training readiness. Participants would then more likely to perceive the "model unit" as a "high status unit." Another discussed change has involved showing the "model unit" making mistakes. The instructional value of this change, however, remains an empirical question.

Potential problems may also exist with these tapes because a systematic instructional strategy for utilizing them, as efficiently as possible, has not been developed. As found in the participants' assessment, some units have tended to view the tapes straight through without much discussion about the information contained in them. A standardized instructional package is thus needed for utilizing the VTP demonstration materials.

This package could be embedded into a computer program resembling a hypermedia instructional system. Such systems use the power of a high-speed personal computer to present materials through a variety of modalities. The computer is also used to arrange the instructional materials vis-a-vis hierarchically organized stacks (sets) of nodes (instructional content) and links, which allow the students to access the subject matter in any given sequence (Park, 1992). A hypermedia program also contains an assessment package that provides the participants with corrective feedback regarding their performance. This program could be designed to be completed by soldiers in a few hours at either their home or armory's/home station's computer(s). Time constraints should thus not be a major concern with utilizing these demonstration materials.

The computer-based demonstration materials would utilize cognitive modeling techniques in order to help armor platoons and companies develop the cognitive strategies needed to make quick and accurate battlefield decisions. It could also be geared toward helping members of ARNG and active units form common understandings (shared mental models; Cannon-Bowers, Salas, & Converse, 1990 as cited by Minionis, Zaccaro, & Perez, 1995) of their collective functions. Such mental models have been shown to be a defining characteristic of successful teams (Minionis et al., 1995; Perez & Minionis, 1995). The eventual focus and content of this instructional package would be based upon interviews with VTP O/Cs and other appropriate military subject-matter experts.

Finally, an empirical test of the proposed demonstration materials' instructional effectiveness is needed. Three types of demonstration materials should be examined: (a) as proposed; (b) as currently available; and (c)as a control set of materials, consisting of a film on tank warfare. Each of these conditions

would take approximately two hours to complete. The participants would be unit leaders from armor platoons and companies (e.g., company commanders, platoon leaders and tank commanders). They would receive this training in small groups at the SIMNET center just prior to executing their VTP tables.

A multimethod-multisource approach will be used to collect the data for this investigation. Incidents of self-regulatory performance (e.g., relative proportion of actions without O/C guidance) should be recorded by observers as the units complete a specified set of VTP tables. The O/Cs would rate each unit's ability to execute the tables. They would also note the number and type of tables completed by the unit. Participants, after executing these tables, would be administered a short questionnaire regarding their performance, which should include items about their sense of self-efficacy. Also, after executing these tables, the participants' mental models of effective unit performance will be ascertained in relationship to Minionis et al's (1995) conceptual mapping technique. This investigation would thus provide further answers to questions about the instructional value of demonstration materials for VTP preparation.

In closing, this report has the following implications for the military training community:

1. The developed demonstration materials, with modifications, should help VTP participants to start or proceed on their individual and collective roads to tactical expertise.

2. It is not necessary to develop a demonstration tape for each VTP table.

3. A modified version of these materials should be incorporated into the VTP, as resources allow.

4. An experimental investigation is needed to provide more definitive conclusions about including demonstration materials as part of the VTP.

References

Alexander, P. A., Schallert, D. L., & Hare, V. C. (1991). Coming to terms: How researchers in learning and literacy talk about knowledge. Review of Educational Research, 61(3), 315-343.

Anderson, J. R. (1983. The architecture of cognition. Cambridge, MA: Harvard University Press.

Annett, J. (1991). Skill acquisition. In J. E. Morrison (Ed.), Training for performance: Principles of applied human learning (pp. 13-51). Chicheser, England: Wiley.

Austin, S., & Miller, L. (1992). An empirical study of the Sybervision golf videotape. Perceptual and Motor Skills, 74, 875-881.

Baggett, P. (1987). Learning a procedure from multimedia instructions: The effects of film and practice. Applied Cognitive Psychology, 1(1), 183-195.

Bandura, A. (1971). Psychological modeling: Conflicting theories. New York: Lieber-Atherton.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84(2), 191-215.

Bandura, A. (1986). Social foundation of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Brown, F. J. (1991). A simulation-based intensified training readiness strategy for the reserve component (IDA Paper P-2611). Alexandria, VA: Institute for Defense Analyses.

Brown, F. J. (1992). Battle command staff training (IDA Paper P-2785). Alexandria, VA: Institute for Defense Analyses.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. Educational Researcher, 18(1), 32-42.

Brown, R., & Pressley, M. (1994). Self-regulated reading and getting meaning from text: The transactional strategies instructional model and its ongoing validation. In D. H. Schunk & B. J. Zimmerman (Eds.), Self-regulation of learning and performance: Issues and educational applications (pp. 155-180). Hillsdale, NJ: Erlbaum.

Burwitz, L. (1975). Observational learning and motor performance. Paper presented at the FEPSAC Conference, Edinburgh, Scotland.

Burwitz, L. (1981). The use of demonstrations and videotape recorders in sport and physical education. In I. M. Cocherill & W. W. MacGillivary (Eds.), Vision and sport (pp. 182-194). London, England: Thornes.

Campbell, D. H., Campbell, R. C., Sanders, J. J., & Flynn, M. C. (1995). Methodology for development of structured simulation-based training (ARI Research Product 95-08). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (ADA 296 171)

Cannon-Bowers, J. A., Salas, E., & Converse, S. (1990). Cognitive psychology and team training: Shared mental models in complex systems. Human Factors Society Bulletin, 33, 1-4.

Collins, A. (1991). Cognitive apprenticeship and instructional technology. In L. Idol & B. F. Jones (Eds.), Educational values and cognitive instruction: Implications for reform (pp. 119-136). Hillsdale, NJ: Erlbaum.

Collins, A. (1995). Design issues of learning environments. In S. Vosnidau, E. De Corte, R. Glaser, & H. Mandl (Eds.), International perspectives on the psychological foundations of technology-based learning environments. Hillsdale, NJ: Erlbaum.

Collins, A., & Brown, J. S. (1988). The computer as a tool for learning through reflection. In H. Mandl & A. Lesgold (Eds.), Learning issues for intelligent tutoring systems (pp. 1-18). New York: Springer.

Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive apprenticeship: Teaching the crafts of reading, writing, and mathematics. In L. S. Resnick (Ed.), Knowing learning, and instruction: Essays in honor of Robert Glaser (pp. 453-494). Hillsdale, NJ: Erlbaum.

Derry, S. J., & Hawkes, L. W. (1995). Local cognitive modeling of problem-solving behavior: An application of fuzzy theory. In S. Lajoie and S. Derry (Eds.), Computers as cognitive tools. Hillsdale, NJ: Erlbaum.

Duffy, T. M. (1995). Strategic teaching framework: An instructional model for learning complex, interactive skills. In C. Dills and A. Romiszowski (Eds.), Instructional development state of the art. Vol. 3: Paradigms. Englewood Cliffs, NJ: Educational Technology.

Ehlinger, J. (1988). The relative merits of characteristics of teacher verbal modeling in influencing comprehension and comprehension modeling of eighth grade readers. A paper presented at the 38th Annual Meeting of National Reading Conference in Phoenix, AZ. (ERIC Reproduction No. 301 864)

Farmer, J. A., Buckmaster, A., & LeGrand, B. (1992). Cognitive apprenticeship for continuing education. New Directions for Adult and Continuing Education, 55, 41-48.

Farnham-Diggory, S. (1994). Paradigms of knowledge and instruction. Review of Educational Research, 64(3), 463-477.

Feltz, D. L. (1982). The effects of age and number of demonstrations on modeling form and performance. Research Quarterly for Exercise and Sport, 53(4), 291-296.

Gagne, R. M. (1985). The conditions of learning and theory of instruction (4th ed.). New York: Holt, Rinehart, and Winston.

Goodrich, H., Collins, A., Holum, A., & Hatch, T. (1995). Cognitive apprenticeship in the classroom: The role of coaching in intellectual development. Cambridge, MA: BBN Laboratories. Unpublished manuscript.

Gorrell, J., & Capron, E. W. (1987). Effects of cognitive modeling and task-oriented attributions on prospective teachers. Paper presented at the 95th Annual Meeting of the American Psychological Association, New York, NY. (ERIC Reproduction No. 290 728).

Gray, J. T., Neisser, U., Shapiro, B. A., & Kouns, S. (1991). Observational learning of ballet sequences: The role of kinematic information. Educational Psychology, 3(2), 121-134.

Gropper, G. L., (1963). Why is a picture worth a thousand words? AV Communications Review, 11(4), 75-95.

Gropper, G. L. (1968). Learning from visuals: Some behavioral consideration. AV Communications Review, 14(1) 37-69.

Gropper, G. L. (1970). Programming visual presentations for procedural learning. AV Communications Review, 16(1), 33-57.

Halff, H. M., Hollan, J. D., & Hutchins, E. L. (1986). Cognitive science and military training. American Psychologist, 41(10), 1131-1139.

Hall, C. S. (1979). A premier of Freudian psychology. New York: New American Library.

Hall, E. G., & Erffmeyer, E. S. (1983). The effects of visual-motor behavior rehearsal with videotaped modeling on free throw accuracy of intercollegiate female basketball players. Journal of Sport Psychology, 5, 343-346.

Hoffman, R. G., Graves, C. R., Koger, M. E., Flynn, M. E., & Sever, R. S. (1995). Developing the RCVTP: History and lessons learned (ARI Research Report No. 1675). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (ADA 296 153)

Holding, D. H. (1965). Principles of training (pp. 59-67). Oxford, England: Pergamon Press.

Holding, D. H. (1987). Concepts of training. In G. Salvendy (Ed.), Handbook of human factors (pp. 939-962). New York: Wiley.

Honebien, P. C., Carr, A., & Duffy, T. (1993). The effects of modeling to aid problem solvers in computer-based learning environments. Paper presented at the annual meeting of the Association of Educational Communications 7 Technology, New Orleans, LA. (ERIC Reproduction No. ED 362 167)

Hovland, C. I., Lumsdaine, A. A., & Sheffield, L. D. (1949). Experiments on mass communication. Princeton, NJ: Princeton University Press.

James, W. (1980/1983). The principles of psychology (pp. 1027-1028). Cambridge, MA: Harvard University Press.

Jaspen, N. (1950). Effects on training of experimental film variables. Study II: Verbalization, "how-it-works," nomenclature, audience participation, and succinct treatment (SDC Technical Report No. 269-7011). Port Washington, New York: Office of Naval Research, Special Devices Center.

Kieras, D. E. (1987). Cognitive modeling. In Encyclopedia of Artificial Intelligence. New York: Wiley Press.

Kimble, G. A., & Wulff, J. J. (1961). "Response guidance" as a factor in the value of student participation in film instruction. In A. A. Lumsdaine (Ed.), A symposium o experimental studies of cue and response factors in group and individual learning from instructional media (pp. 217-226). Washington, DC: National Academy of Sciences-National Research Council.

Lajoie, S. P., & Lesgold, A. (1992). Apprenticeship training in the work place: Computer-coached practice environment as a new form of apprenticeship. In M. J. Farr & J. Psotka (Eds.), Intelligent instruction by computer: Theory and practice (pp. 15-36). Washington, DC: Taylor & Francis.

Laner, S. (1954). Some factors influencing the effectiveness of an instructional film. British Journal of Psychology, 46, 280-292.

Lesgold, A., Lajoie, S. P., Bunzo, M., & Eggan, G. (1992). A coached practice environment for an electronics troubleshooting job. In J. Larkin, R. Chabey, & C. Cheftic (Eds.), Computer assisted instruction and intelligent tutoring systems: Establishing communication and collaboration (pp. 201-238). Hillsdale, NJ: Erlbaum.

Lockhart, A. (1944). The value of motion pictures as an instructional device in learning a motor skill. Research Quarterly, 47, 277-292.

Lumsdaine, A. A. (1961). A symposium on experimental studies of cue and response factors in group and individual learning from instructional media. Washington, DC: National Academy of Sciences-National Research Council.

McCullagh, P. (1986). Model status as a determinant of observational learning and performance. Journal of Sport Psychology, 8, 319-331.

Mandinach, E. B. (1987). Clarifying the "A" in CAI for learners of different abilities. Journal of Educational Computing Research, 3(1), 113-129.

Meichenbaum, D. (1977). Cognitive behavior modification. New York: Plenum Press.

Michael, D. N., & Maccoby, N. (1953). Factors influencing verbal learning under varying conditions of audience participation. Journal of Experimental Psychology, 46(6), 411-418.

Miller, E. E. (1972). Military psychology and training. In R. N. Singer (Ed.), The psychomotor domain: Movement behavior (pp. 133-164). Philadelphia, PA: Lea & Febiger.

Miller, N. E., & Dollar, J. (1941). Social learning and imitation. London, England: Keegan Paul.

Minionis, D. P., Zaccaro, S. J., & Perez, R. (1995, May). Shared mental models, team coordination, and team performance. Paper presented at the 10th annual meeting of the Society for Industrial and Organizational Psychology, Orlando, FL>

National Council on Vocational Education (1991). Solutions. Washington, DC: Author. (ERIC Reproduction No. ED 353 398)

Nelson, D. O. (1958). Effects of slow-motion loop films on learning of golf. Research Quarterly, 29, 37-45.

Olmstead, J. A. (1992). Battle staff integration (IDA Paper P-2560). Alexandria, VA: Institute for Defense Analyses.

Palinscar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. Cognition and Instruction, 1(2), 117-175.

Park, O. (1992). Instructional applications of hypermedia: Functional features, limitations, and research issues. Computers I Human Behavior, 8, 259-272.

Perez, R. S., & Minionis, D. P. (1995). Shared cognition and collective problem solving. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. Unpublished manuscript.

Piaget, J. (1951). Play, dreams and imitation in childhood. New York: Norton.

Robert, M., & Chaperon, H. (1989). Cognitive and exemplary modeling of horizontality representation on the Piagetian water-level task. International Journal of Behavioral Development, 12(4), 453-472.

Rosenthal, T. L., Moore, W. B., Dorfman, H., & Nelson, B. (1971). Vicarious acquisition of a simple concept with experimenter as model. Behavior Research & Therapy, 9, 219-227.

Rosenthal, T. L., & Zimmerman, B. J. (1978). Social learning and cognition. New York: Academic Press.

Scardamalia, M., Bereiter, C., & Steinbach (1984). Teachability of reflective processes in written scales. Cognitive Science, 8, 173-190.

Schunk, D. H. (1981). Modeling and attributional effects on children's achievement: A self-efficacy analysis. Journal of Educational Psychology, 73(1), 93-105.

Schunk, D. H. (1984). Modeled importance of learning strategies and children's achievement behaviors. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA (ERIC Reproduction No. 243 966)

Schunk, D. H., & Zimmerman, B. J. (1995). Modeling and self-efficacy influences on children's development of self-regulation. In K. Wetnzel & J. Juvonen (Eds.), Social motivation: Understanding children's school adjustment. New York: Cambridge University Press.

Scully, D. H., & Newell, K. M. N. (1985). Observational learning and the acquisition of motor skills: Towards a visual perception perspective. Journal of Human Movement Studies, 11, 169-181.

Shank, R. C. (1990). Teaching architectures (Technical Report 3). Evanston, IL: Northwestern University, The Institute for Learning Science.

Shlechter, T. M., Bessemer, D. W., & Kolosh, K. P. (1991). Role-playing and the effectiveness of a high technology training simulator (ARI Technical Report No. 938). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A224 913)

Shlechter, T. M., Bessemer, D. W., Nesselroade, K. P., & Anthony, J. (1995). Initial evaluation of a simulation-based training program for Army National Guard Units (ARI Research Report 1679). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A297 271)

Singer, R. N. (1980). Motor learning and human performance: An application to motor skills and movement behaviors (3rd ed.) (pp. 344-348). New York: Macmillan.

Sternberg, R. J. (1985). Beyond IQ: A triarchic theory of human intelligence. New York: Cambridge University Press.

Sukemune, S., Haruki, Y., and Kashiwagi, K. (1977). Studies on social learning in Japan. American Psychologist, 924-933.

The Cognition and Technology Group at Vanderbilt (1993, March). Anchored instruction and situated cognition revisited. Educational Technology, 52-70.

Thornburg, S. G. (1991). Strategy instruction for academically at-risk students: An exploratory study of teaching "Higher-Order" reading and writing in the social studies. Journal-of-Reading-Writing-and-Learning-Disabilities-International 7(4), 377-406.

Vygotsky, L. S. (1978). (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Mind in society: The development of higher psychological processes. Cambridge, MA: Harvard University Press.

Whiting, H. T. A., Bijlard, M. J., & den Brinker, B. P. L. M. (1987). The effect of the availability of a dynamic model on the acquisition of a complex cyclical action. The Quarterly Journal of Experimental Psychology, 39A, 43-59.

Zimmerman, B. J., & Bonner, S. (1995). A social cognitive view of strategic learning. In C. E. Weinstein & B. L. McCombs (Eds.), Strategic learning: Skill and self-regulation. Hillsdale, NJ: Erlbaum.

Zimmerman, B. J., & Martinez-Pons, M. (1992). Perceptions of classroom: Causes and consequences (pp. 185-207). Hillsdale, NJ: Erlbaum.

Zimmerman, B. J., & Ringle, J. (1981). Effects of model persistence and statement of confidence on children's self-efficacy and problem solving. Journal of Educational Psychology, 73(4), 485-493.

Zimmerman, B. J., & Rosenthal, T. L. (1972). Concept attainment, transfer, and retention through observation and rule-provision. Journal of Experimental Child Psychology, 14, 139-150.

Zimmerman, B. J., & Rosenthal, T. L. (1974). Conceptual generalization and retention by young children: Age, modeling, and feedback effects. The Journal of Genetic Psychology, 125, 233-245.

Appendix A

A Prototype Questionnaire Form

Unit:_____Duty Position:_____ Date:___

These questions deal with the **introduction and demonstration videotapes which your unit received prior to RCVTP training at Fort Knox.**

1. Indicate whether you viewed any of the RCVTP tapes prior to RCVTP training at Fort Knox: (put a check mark by the appropriate response)

_____Yes
_____No (please stop here and turn in this unit survey form)

2. Use the following scale to indicate the length of time since viewing the different RCVTP tapes: (for this question and the remaining questions, leave blank all tapes not viewed)

A=less than 1 month ago; B=1-2 months ago;
C=more than 2 months ago

_____Introduction to the RCVTP
_____Armor Platoon Offense
_____Armor Platoon Defense
_____Mech Platoon Offense
_____Mech Platoon Defense
_____Scout Platoon Offense
_____Scout Platoon Defense
_____Armor Company Offense
_____Armor Company Defense
_____Armor Bn/TF Offense
_____Armor Bn/TF Defense

3. Use the following scale to indicate the location of viewing these tapes: A=only at the armory, H=only at home, AH=both at the armory and at home.

_____Introduction to the RCVTP
_____Armor Platoon Offense
_____Armor Platoon Defense
_____Mech Platoon Offense
_____Mech Platoon Defense
_____Scout Platoon Offense
_____Scout Platoon Defense
_____Armor Company Offense
_____Armor Company Defense
_____Armor Bn/TF Offense
_____Armor Bn/TF Defense

4. Use the following scale to indicate whether you viewed the tape(s) by yourself or with others in your unit:

A=only with others; B=mostly with others; C=mostly by yourself;
D=only by yourself.

_____Introduction to the RCVTP
_____Armor Platoon Offense
_____Armor Platoon Defense
_____Mech Platoon Offense
_____Mech Platoon Defense
_____Scout Platoon Offense
_____Scout Platoon Defense
_____Armor Company Offense
_____Armor Company Defense
_____Armor Bn/TF Offense
_____Armor Bn/TF Defense

5. Use the following scale to indicate whether you discussed the tape(s) with personnel in your unit:

A=more than an hour; B=less than an hour; C=not at all

_____Introduction to the RCVTP
_____Armor Platoon Offense
_____Armor Platoon Defense
_____Mech Platoon Offense
_____Mech Platoon Defense
_____Scout Platoon Offense
_____Scout Platoon Defense
_____Armor Company Offense
_____Armor Company Defense
_____Armor Bn/TF Offense
_____Armor Bn/TF Defense

6. Use the following scale to indicate how you generally watched the tape(s):

A=straight through from beginning to end;
B=rewinding and reviewing as needed;
C=both of the above

_____Introduction to the RCVTP
_____Armor Platoon Offense
_____Armor Platoon Defense
_____Mech Platoon Offense
_____Mech Platoon Defense
_____Scout Platoon Offense
_____Scout Platoon Defense
_____Armor Company Offense
_____Armor Company Defense
_____Armor Bn/TF Offense
_____Armor Bn/TF Defense

7. Use the following scale to indicate your opinion about the amount of information the tape(s) contain(s):

A=too little information; B=right amount of information;
C=too much information

_____Introduction to the RCVTP
_____Armor Platoon Offense
_____Armor Platoon Defense
_____Mech Platoon Offense
_____Mech Platoon Defense
_____Scout Platoon Offense
_____Scout Platoon Defense
_____Armor Company Offense
_____Armor Company Defense
_____Armor Bn/TF Offense
_____Armor Bn/TF Defense

8. Use the following scale to indicate your opinion about the usefulness of the information the tape(s) contain(s):

A=not at all useful; B=slightly useful; C=fairly useful;
D=extremely useful

_____Introduction to the RCVTP
_____Armor Platoon Offense
_____Armor Platoon Defense
_____Mech Platoon Offense
_____Mech Platoon Defense
_____Scout Platoon Offense
_____Scout Platoon Defense
_____Armor Company Offense
_____Armor Company Defense
_____Armor Bn/TF Offense
_____Armor Bn/TF Defense

9. List some general points that you consider useful from the RCVTP tape(s).

A_____

B_____

C_____

D_____

E_____

10. List some specific actions or events that you remember from the RCVTP tape(s).

A_____

B_____

C_____

D_____

E_____

11. In your opinion, should tapes of this type be provided for other tactical training programs? (put a check mark by the appropriate response)

_____Yes
_____No

Please comment as to why tapes of this type should or should not be provided for other tactical training programs.

_____

_____

_____

_____

12. Please provide any other comments you may have concerning these tapes.

_____

_____

_____

_____

_____

_____

13. Have you had any experience with SIMNET training prior to this weekend?

_____ Yes

_____ No

If yes, please indicate when your last SIMNET training occurred.

_____ 0-2 months ago
_____ 3-6 months ago
_____ 6-12 months ago
_____ more than a year ago

Appendix B

Results of the Descriptive Analyses of the Participants' Responses to Questionnaire Items 2-6

Table B-1

Results of Item 2's Data: Percent of Time in Months between VTP training and Viewing the Tapes

		Time in Months		
Tape	n*	< 1 mo	1-2 mo	> 2 mo
Introduction to the VTP	237	63.3**	14.3	22.4
Armor Platoon Offense	172	59.3	23.8	16.9
Armor Platoon Defense	135	58.5	20.0	21.5
Mech Platoon Offense	24	33.3	8.3	58.3
Mech Platoon Defense	23	39.1	8.7	52.2
Scout Platoon Offense	41	51.2	24.4	24.4
Scout Platoon Defense	40	47.5	25.0	27.5
Armor Company Offense	68	50.0	33.8	16.2
Armor Company Defense	52	53.8	23.1	23.1
Armor BN/TF Offense	51	72.5	11.8	15.7
Armor BN/TF Defense	52	71.2	13.5	15.4
Totals	895	58.5**	19.4	22.0

*n equals number of respondents per tape.
**percent per tape.
***percent per viewing category.

Table B-2

Results of Item 3's Data: Percent of Participants Viewing Tapes at Home Station, at Home, or at SIMNET

		Place of Viewing		
Tape	n*	Home Station	Home	SIMNET
Introduction to the VTP	232	67.0**	8.3	24.8
Armor Platoon Offense	176	75.3	9.6	15.2

Table B-2 Continued

Armor Platoon Defense	135	72.6	8.9	18.5
Mech Platoon Offense	24	54.2	16.7	29.2
Mech Platoon Defense	22	61.9	19.0	19.0
Scout Platoon Offense	41	38.1	23.8	38.1
Scout Platoon Defense	38	41.0	25.6	33.3
Armor Company Offense	71	69.3	14.7	16.0
Armor Company Defense	54	66.7	16.7	16.7
Armor BN/TF Offense	48	46.2	9.6	44.2
Armor BN/TF Defense	50	44.8	10.3	44.8
Totals	891	64.1***	11.8	100.0

*n equals number of respondents per tape.
**percent per tape.
***percent per viewing category.

Table B-3

Results of Item 4's Data: Percent of Participants Viewing Tapes with Others or Individually

	n	Only with Others	Mostly with Others	Mostly by Oneself	Only by Oneself
Introduction to the VTP	233	80.3**	15.0	3.0	1.7
Armor Platoon Offense	179	70.9	21.8	4.5	2.8
Armor Platoon Defense	131	64.9	23.7	6.9	4.6
Mech Platoon Offense	22	50.0	31.8	13.6	4.5
Mech Platoon Defense	21	47.6	33.3	14.3	4.8
Scout Platoon Offense	38	68.4	18.4	10.5	2.6
Scout Platoon Defense	36	69.4	16.7	11.1	2.8
Armor Company Offense	69	62.3	30.4	4.3	2.9
Armor Company Defense	50	66.0	28.0	4.0	2.0
Armor BN/TF Offense	47	76.6	17.0	4.3	2.1
Armor BN/TF Defense	49	75.5	18.4	4.1	2.0
Totals	675	70.9**	21.0	5.4	2.7

*n equals number of respondents per tape.
**percent per tape.
***percent per viewing category.

Table B-4

Results of Item 5's Data: Percent of Participants Discussing Tapes for More than an Hour, Less than an Hour, or Not at All

Tape	n*	> 1 hour	< 1 hour	Not at All
Introduction to the VTP	232	21.6**	59.5	19.0
Armor Platoon Offense	176	32.4	55.7	11.9

Table B-4 Continued

Armor Platoon Defense	135	34.1	54.1	11.9
Mech Platoon Offense	24	25.0	50.0	25.0
Mech Platoon Defense	22	22.7	54.5	22.7
Scout Platoon Offense	41	29.3	53.7	17.1
Scout Platoon Defense	38	28.9	52.6	18.4
Armor Company Offense	71	43.7	47.9	8.5
Armor Company Defense	54	33.3	59.3	7.4
Armor BN/TF Offense	48	31.3	56.3	12.5
Armor BN/TF Defense	50	30.0	56.0	14.0
Totals	891	29.9***	55.7	14.5

*n equals number of respondents per tape.
**percent per tape.
***percent per viewing category.

Table B-5

Results of Data for Item 6: Percent of Participants Viewing Tapes Straight Through, Rewinding and Reviewing, or Both Methods

Tape	n*	Straight through	Rewind/ review	Both methods
Introduction to the VTP	232	82.3**	8.2	9.5
Armor Platoon Offense	174	84.6	16.7	17.2
Armor Platoon Defense	136	66.9	13.2	19.9
Mech Platoon Offense	20	60.0	10.0	30.0
Mech Platoon Defense	20	55.0	15.0	30.0
Scout Platoon Offense	38	63.2	15.8	21.1
Scout Platoon Defense	36	61.1	16.7	22.2
Armor Company Offense	69	50.7	15.9	33.3
Armor Company Defense	51	52.9	17.6	29.4
Armor BN/TF Offense	48	58.3	10.4	31.3
Armor BN/TF Defense	50	60.0	8.0	32.0
Totals	873	67.0***	12.8	20.2

*n equals number of respondents per tape.
**percent per tape.
***percent per viewing category.

Appendix C

Means of the Unit Leaders'[1] Responses to Questionnaire Items Dealing with the Tapes' Usefulness and Informativeness

Tape	Usefulness*	Informativeness**
Introduction to the VTP	3.13 (n=88)***	1.83 (n=106)
Armor Platoon Offense	3.12 (n=85)	1.87 (n=93)
Armor Platoon Defense	3.11 (n=65)	1.87 (n=69)
Mech Platoon Offense	3.33 (n=9)	1.90 (n=10)
Mech Platoon Defense	3.38 (n=8)	1.89 (n=9)
Scout Platoon Offense	3.05 (n=22)	1.57 (n=28)
Scout Platoon Defense	2.91 (n=22)	1.54 (n=28)
Armor Company Offense	3.24 (n=51)	1.93 (n=54)
Armor Company Defense	3.28 (n=32)	1.94 (n=34)
Armor BN/TF Offense	3.30 (n=33)	1.97 (n=34)
Armor BN/TF Defense	3.26 (n=35)	2.00 (n=36)

* with 1=not at all useful; 2=slightly useful; 3=fairly useful; 4=extremely useful.
** with 1=too little information; 2=right amount of information; 3=too much information.
*** number of respondents.

[1] Unit leadership included all participant positions except those of drivers, loaders, gunners, and first sergeants.

Appendix D

Content Analyses on the Open-Ended Questionnaire Items

Table D-1

Results of the Content Analysis on Comments about the Useful Aspects of the VTP tapes(Questionnaire Item 9)

Categories	Number of Comments (n=232)*	Percent of Total Comments
Provided (Re-)Familiarization with the Learning Situation	162	45.8
Showed Effective Performance on Different VTP Tasks	105	29.7
Provided (Re-)Familiarization with Crew Station Skills	32	9.1
Provided Help with Navigating SIMNET	10	4.3
Other Types of Comments**	35	9.9
Provided Little Useful Information	4	1.2
Totals	353***	100.0

* 142 or 38% of the participants did not comment.
** each subcategory reflected less than 1% of total responses.
*** respondents could have made more than one response.

Table D-2

Results of the Content Analysis on Comments about Specific Actions Recalled from the tapes (Questionnaire Item 10)

Categories	Number of Comments (n=176)*	Percent of Total Comments
Formations and Movements	55	22.9
Contact with the Enemy	54	22.5
Offensive/Defensive Exercises (non-specific actions)	34	14.2
Command and Control	26	10.8
Station /Position Instructions	21	8.8
Reactions to Direct/Indirect Fire	11	4.6
Navigation/Terrain Features	7	2.9

Table D-2 Continued

Other Types of Comments**	32	13.3
Totals	240***	100.0

* 198 or 53% of the participants did not comment.
** each subcategory reflected less than 1% of total responses.
*** respondents could have made more than one response.

Table D-3

Results of the Content Analysis on Comments about the Usefulness of Providing Tapes to Other Tactical Training Program (Questionnaire Item 11a)*

Categories	Number of Comments (n=214)**	Percent of Total Comments
Provide Familiarization with the Learning Situation	95	41.8
Provide Standard of Performance	68	30.0
Save Training Costs or Resources	20	8.8
Motivate Participants	9	4.0
Other Types of Comments***	35	15.4
Totals	227	100.0

* based on the 283 Yes responses to Questionnaire Item 11.
** 69 or 24% of the 283 possible respondents did not comment.
*** each subcategory reflected less than 1% of total responses.

Appendix E

Aggregate Results of the Interview Data for Two Armor Companies and One Scout Platoon

I. Use of the VTP tapes.

A. Number of comments regarding different modes of viewing the tapes for VTP preparation:

Armor	Scout	
6		Start and stop tape and then rehearse
5		View the tape straight through then rehearse
1		Rehearse then view the tape straight through
	1	No Response

B. Number of comments regarding different modes of viewing the tapes for discussing tactics:

Armor	Scout	
2		Start and stop tape and rehearse
3		View the tape straight through then rehearse
1		Rehearse then view the tape straight through
	1	No Response

C. Number of comments about various problems encountered by participants while using the tapes to prepare for their VTP rotation.

Armor	Scout	
3	3	Not enough time for viewing tapes
4		Not much help with crew skills
3		Not realistic
3		Not enough tapes to take home
1		Mistakes on the tapes
1		More generalizable

II. Content of these Tapes.

A. Number of comments about specific events on the tapes that helped participants to complete their VTP missions.

Armor	Scout	
8		Command and control
6		Formations/movements
2	1	Navigation
2		Battle engagements

	1	Refueling

B. Number of comments regarding reasons that these tapes were of value to the participants.

Armor	Scout	
5	1	Good for (re)familiarizing one with the learning situation
5		Good at setting standards of performance
3		Good for viewing different formations
3		Good for showing command and control
1		Good for viewing battle drills

C. Should the narrator have spent more or less time discussing the underlying concepts about tactics?

Armor	Scout	
1		More
1		Less
	1	No Comment

D. Number of comments regarding reasons for responses to IIC.

Armor	Scout	
2		We know tactics already
2		Narrator should talk more about SIMNET
	1	Tapes demonstrated excellent tactics

III. Recommended changes

Armor	Scout	
10	2	Make materials PC-based/interactive
2	2	More VCR tapes for home use
3	1	Show a crew's view of the battle scene